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AUTHOR Graden, Janet L.; And Others
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ABSTRACT

The effect of different instructional variables on students' academic responding time was the focus of the current study. A total of 54 students from 10 classrooms in 5 suburban elementary schools served as subjects. In each school, six students were randomly selected from each of two classrooms, resulting in a group of 22 third graders and 32 fourth graders (26 boys and 28 girls). Each target student was observed over the entire school day, and six event areas were recorded: activity, task, teaching structure, teacher location, teacher activity, and student response. An interval time-sampling technique was used to direct the recording of events in 10-second intervals over the entire day. Ten selected observers recorded data. Results were presented in five areas: the class activity, the task used, the teaching structure, the teacher's location relative to the student, and the teacher's activity. Overall, results indicated that instructional variables do have an impact on students' academic responding. It was suggested that, through an awareness of the effect of different instructional variables on student academic response, results can be applied to increase the time students spend engaged in academic tasks. (BJD)

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Janet L. Graden, Martha L. Thurlow, and James E. Ysseldyke

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Janet L. Graden, Martha L. Thurlow, and James E. Ysseldyke
Institute for Research on Learning Disabilities
University of Minnesota

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Abstract

The academic responding times of 54 elementary students were examined to identify differences in academic engaged rates as a function of activity, task, teaching structure, teacher location, and teacher activity. Statistically significant differences in academic engagement were found in each of the areas. In general, the percentage of academic responding tended to be higher during academic activities, when using paper and pencil, readers, workbooks and worksheets, in small group or individual settings, with the teacher at the teacher's desk or at the side of the student, and with the teacher either not making an observable response or giving approval. Implications of the findings for improved classroom practices are discussed.

When Are Students Most Academically Engaged? Students' Academic Responding Time in Different Instructional Ecologies

In efforts to identify variables that characterize effective teaching, a significant factor has consistently emerged--the importance of giving students adequate time to learn. Research on effective teaching (e.g., Anderson, Evertson, & Brophy, 1979; Brophy, 1979; Evertson & Anderson, 1978; Good, 1979) has demonstrated that effective teachers enhance student learning by providing direct instruction and by providing students with the opportunity to learn. In other research, it has been demonstrated that time spent engaged in learning is a significant correlate of student achievement (cf. Borg, 1980; Graden, Thurlow, & Ysseldyke, 1982a). A second finding of these studies highlighting the significant relationship between time and learning is that students currently spend only a relatively small portion of the school day actively engaged in academic responses (Graden, Thurlow, & Ysseldyke, 1982b; Hall, Greenwood, Delquadri, & Thurston, 1980; Rosenshine, 1980; Rosenshine & Berliner, 1978). Yet, the concept of academic engaged time can be important in intervening in classrooms; it is a variable that teachers can control and alter and that is likely to have a significant positive impact on student achievement (Bloom, 1980).

The extent to which students' academic responding time varies as a function of the classroom ecology, variables under the teacher's control, was the focus of the current study. Describing how academic responding time varies for different instructional variables is an important first step in efforts to increase academic responding time in classrooms.

Previous studies at the Minnesota Institute for Research on Learning Disabilities (IRLD) documented the instructional ecology and academic responding time for a large number of regular education and learning disabled (LD) students. Results from regular third and fourth grade classrooms revealed that students were engaged in academic responding for 45 minutes (21%) of the instructional day, in task management behaviors for 140 minutes (66%) of the instructional day, and in inappropriate behaviors for 27 minutes (13%) of the instructional day. These studies employed an observation system developed at Juniper Gardens Children's Project, University of Kansas (Greenwood, Delquadri, & Hall, 1978) which focuses on describing instructional ecology and student academic response, including the important variable of time engaged in academic responding (writing, reading aloud or silently, answering and asking questions, talking about academics, and playing academic games). In this observation system, the instructional ecology variables include the classroom activity, the tasks or methods used, the structure or grouping of the class, the teachers' location relative to the student and the teacher's activity or response to the student. Individual students are observed for the entire school day and the instructional ecology and student response is coded in 10 second intervals, thus leading to a very specific, detailed description of how students receive instruction and spend their time in school.

The instructional ecology variables--activity, task, structure, teacher location, and teacher activity--have been the topic of several other research investigations, most of which have studied one or two

of these variables in isolation and the effect of the variable on students' engagement rates and/or achievement. In an investigation of the effect of the subject area (activity), the day of the week, and the activity format (structure) on "student involvement" (student engagement in academic behaviors), Cornbleth and Korth (1980) observed 26 fourth grade students over 30 observation periods during science, social studies, language, and math instruction. They reported that pupil involvement was significantly higher during science and social studies than during language and math instruction, but that there were no significant differences in student involvement as a function of the day of the week or the format (large group or individual activities). They hypothesized that the differential student involvement during the various subject areas was because the time allocated to science and social studies was shorter than during language and math, thus leading to higher engagement rates. Filby (1978) and Rosenshine (1980) reported on a series of investigations from the Beginning Teacher Evaluation Study (BTES), a major study of student engaged time for over 250 pupils with average achievement in grades 2 and 5. Students were observed during reading and math instruction over the course of the school year. The investigators reported no significant differences in pupil engagement rates as a function of the activity (reading or math), but results indicated that engagement rates were higher during teacher-directed group instruction than during pupil-directed seatwork (individual instruction).

Other investigations studied the effect of different task formats on student academic responding. Anderson and Scott (1978) observed

105 high school students in 15 humanities and social studies classes. In addition to studying the effect of five task formats--lecture, discussion, seatwork, group work, and other media--on student engaged time, they included the students' acheivement level and academic self concept. Anderson and Scott concluded that, overall, there was no clear trend of higher engagement rates for any task format for all students, although some formats resulted in higher engagement rates for some groups. For example, high academic self concept students were more engaged during seatwork activities than low academic self concept students. One report from the Kansas studies on instructional ecology and student academic responding (Greenwood, Delquadri, Stanley, Terry, & Hall, 1981) indicated that various tasks were differentially related to student academic responses. In a study of 93 fourth grade students, Greenwood et al. reported that paper and pencil and workbook tasks resulted in more writing behaviors, use of readers (textbooks) were associated with more reading behaviors (both silent and oral reading), teacher-student discussions were associated with more passive student responses (attending or listening), and "fetch/put away" (getting materials ready) resulted in more non-academic responses such as task management (moving) and non-academic talking.

Several studies have addressed the effect of various grouping structures--large group, small group, and individual--on student behaviors; they have reported conflicting findings. Many investigations have concluded that there are no demonstrated differences between student academic behaviors during different

classroom structures, while others have reported that entire class grouping structures result in higher pupil engagement rates than individual structures. Cooley and Leinhardt (1980) conducted an extensive evaluation study of several first and third grade reading and math classrooms. A major conclusion of the investigation was the lack of demonstrated superiority of individual instruction over large group instruction. Slavin (1980) studied 252 fourth and fifth grade students' on-task time during team tasks and individual tasks (the variable of cooperative versus individual reward also was included). No difference was found in student time on task during group versus individual tasks. Probst (1980) reported no differences in pupil on-task behaviors during entire group, small group, and individual instructional groupings for three eighth grade classrooms. Finally, the previously cited study by Cornbleth and Korth (1980) failed to find significant differences in student response as a function of the grouping structure.

Other investigations have concluded that large group structures are superior in producing higher student engagement. In a review of several studies on the effect of teaching processes on student outcomes, Ruff (1978) concluded that small group and large group instructional structures were more effective than individual structures with respect to increasing student engaged time. In the previously cited BTES study by Filby (1978), teacher-directed entire group settings resulted in higher student engagement rates than individual student work. Easton, Muirhead, Frederick, and Vanderwicken (1979) found that student involvement in 74 elementary

classrooms during reading instruction was higher when students were taught in one large group than when they were instructed in two or three small groups. Productivity of instructional time also was reported as higher during large and small group instructional settings than during individual structures by Keisling (1977-78) in a study of 2400 fourth, fifth, and sixth grade students.

These investigations present an incomplete and sometimes conflicting picture of the effect of various instructional ecologies on students' academic responding. The present study was directed at observing instructional ecology and student responding to derive a thorough description and comparison of students' academic responding during the instructional ecology variables of classroom activity, task or method, grouping structure, teacher location, and teacher activity (response to student).

The following research questions were posed to investigate the extent to which academic responding time differed as a function of the instructional ecology:

- To what extent does the percentage of academic responding time differ as a function of the classroom activity?
- To what extent does the percentage of academic responding time differ as a function of the tasks used?
- To what extent does the percentage of academic responding time differ as a function of the teaching structure?
- To what extent does the percentage of academic responding time differ as a function of the teacher's location relative to the student?
- To what extent does the percentage of academic responding time differ as a function of the teacher activity?

Method

Subjects

Fifty-four students from 10 classrooms in five elementary schools in a suburban school district served as subjects. In each school, six students were randomly selected from each of two classrooms. The teachers in these classrooms included eight females (four third grade, four fourth grade) and two males (two fourth grade). Overall, 22 of the students (four classrooms) were third graders and 32 (six classrooms) were fourth graders; 26 were boys and 28 were girls.

All teachers and students were volunteer participants in the observational study. At the beginning of the school year, the school district sent consent forms to all teachers and to the parents of all students within the target grade levels in the five designated schools. Homeroom classes from which target students would be chosen were randomly selected from those in which teachers had signed consent forms.

Observation System

The CISSAR (Code for Instructional Structure and Student Academic Response) observation system was used in this study. The system employed was developed by the Juniper Gardens Children's Project in Kansas City, Kansas (Greenwood et al., 1978). Rather than sampling activities of several students at the same time, in this system one target student was observed over the entire school day and six event areas were recorded: (a) activity (12 codes), (b) task (8 codes), (c) teaching structure (3 codes), (d) teacher location (6 codes), (e) teacher activity (5 codes), and (f) student response (19 codes

including 7 codes for academic responding, 5 codes for task management responding, and 7 codes for inappropriate responding).[1] Seventeen stop codes also were used to record reasons for termination of observation. The definitions of the event areas, the specific events recorded within each area, and examples may be found in Graden, Thurlow, and Ysseldyke (1982b). Excluding the stop codes, a total of 53 different events could be recorded with the CISSAR system.

An interval time sampling technique was used to direct the recording of events in 10-second intervals over the entire school day while the student was in the classroom. Coding was structured into consecutive blocks of seven 10-second intervals. During the first 10-second interval, activity, task, and teaching structure were recorded. During each of the next 10-second intervals, teacher location, teacher activity, and student response were recorded. This pattern was maintained throughout the observation.

An auditory electronic timer attached to a clipboard was used to signal the 10-second intervals. The timer was equipped with an earplug so that only the observer could hear the signal (a short beep sound). The clipboard was used to hold coding sheets and to provide a hard surface for marking events. The coding sheets, modeled after those used by the Juniper Gardens Children's Project (Stanley & Greenwood, 1980) were designed at Minnesota's Institute to be read automatically by an optical scanner.

Observers

Thirteen individuals served as observers; ten of the observers were responsible for the majority of the observations, and the other

three observers were substitutes who filled in for reasons of sickness, make-up observations, and so on. These substitute observers were Institute staff members who conducted observer training sessions and monitored the regular observers. The regular observers were selected from a pool of 50 female applicants who had responded to an ad in a local newspaper. To minimize biases that might be brought to the classroom setting, a prerequisite for consideration was that the applicant not have a background in education. Additional selection criteria included average or above average reading ability and performance on selected parts of a general office skills test. A personal interview with one of two IRLD staff members comprised the final step of selection.

Of the 10 selected observers, three had attended college for at least one year and one had a BA. Two others had completed a business or vocational school program. Previous employment varied greatly, including sales, clerical, foster parent, own business, and social worker. All but two observers had a child or children in elementary or secondary school. Observers did not work in schools in which their children were enrolled.

Procedures

Observer training. Training of observers in the observation system was accomplished through the use of an Observer and Trainer's Manual (Stanley & Greenwood, 1980). The manual presented eight units that, according to the authors, were sequenced in terms of the complexity of the recording skills covered. Training required observers to read materials and then practice coding small numbers of

events through the use of a variety of media, including flashcards, overheads, and videotapes. Exercises or quizzes were presented throughout the manual. Mastery (100%) of the material in each unit was required before continuing in the training to the next unit.

Training in the system was conducted by four Institute staff members. Two weeks of half-day training sessions were required to cover the material presented in the manual. This was followed by two to three days of practice coding within actual classrooms.

Data collection. Observers coded activities on either a whole-day (one observer all day) or half-day (one observer for morning, another for afternoon) basis. Observations were not conducted during breaks, such as those for lunch, recess, and bathroom. Also, observers did not code during physical education, music, or special assembly programs since the observation system did not apply to these situations. Typically, observers did not code continuously for a period of more than 1½ to 2 hours because of these breaks within the school day. Observers followed target students when they left their homerooms to go to other classrooms for other subjects (typically reading and/or mathematics). Coding was conducted in these classrooms in the same manner as in homerooms. Regardless of the physical setting, observers attempted to position themselves to be unobtrusive and to avoid revealing the identity of target students to the teachers, the target students themselves, or to other students.

Each target student was observed for two full school days. The decision to collect two days of data on each student was based on stability analyses presented by Greenwood et al. (1981), in which they

found one day of observation predicting 62% of the variance for activity and 92% of the variance for student response. Observations were conducted in all schools at approximately the same time (2 days in school 1, 2 days in school 2, etc.). The order of observation of students within a class was random; classrooms were scheduled for observation so that observers would be present in the classroom on different days of the week. For each classroom, students' names were listed alphabetically and observers signed up for observation of students on a random basis. In addition, teachers were not informed as to the identity of the students being observed. Observers located their target students by means of either a seating chart or by name tags on students' desks in the homeroom.

Since more than one student was observed in each classroom, schedules were arranged so that two observers coded in each classroom on each day of observation. This allowed for the observation of two students during each day in a particular classroom. All observations (2 days for 54 students) were completed during the fall of the year.

Reliability. Reliability checks were conducted throughout the study to detect any inconsistencies in coding among observers or between an observer and the established code definitions. The reliability checks were conducted by the observer pairs within each room; one of the two observers, designated randomly as the reliability observer, stopped observing her target student and coded events on the same student as the other observer in the classroom for approximately 14 minutes (4 pages of observation). During the study, 41 reliability checks were completed.

Two types of reliability were checked: (a) behavioral, and (b) sequential. Behavioral reliability was a measure of observer agreement on a specific event being observed; behavioral reliabilities were calculated for (a) teacher position, (b) teacher activity, and (c) student response. The second type of reliability, sequential reliability, was a measure of observer agreement on a sequence of items; this measure was designed to document that observers were coding in the sequence required by the observation system. According to the CISSAR training manual, the desired levels of reliability were 90% for behavioral reliability and 85% for sequential reliability. Table 1 is a summary of the reliabilities obtained during the present study.

Insert Table 1 about here

To maintain adequate levels of reliability throughout the study. meetings were held to discuss coding problems, reliability disagreements, and so on. These were held on a weekly basis for the first two weeks of the study, and then on a biweekly basis after that. At the meetings, definitions were reviewed and any disagreements were resolved.

Data Analysis

Data were analyzed using dependent t tests to identify significant differences ($p \leq .01$) between proportion of time spent engaged in academic responding during different instructional ecology variables (i.e., activity, task, structure, teacher location, and

teacher activity). Proportions of time were computed by dividing the average daily time engaged in overall academic responding across all students by the average total time in the instructional ecology variable. Proportions were used to control for differences in the actual times allocated to the different instructional variables.

Results

Results are presented for each of five research questions. Differences in student academic responding time were examined as a function of the class activity, the task used, the teaching structure, the teacher's location relative to the student, and the teacher's activity.

To What Extent Does the Percentage of Academic Responding Time Differ as a Function of the Classroom Activity?

The first comparison contrasted the percentage of academic responding time during academic versus non-academic activities. The percentages and minutes of academic responding time during academic and non-academic activities are shown in Table 2. Students were actively engaged in academic responding for about 42 minutes (28%) of the allocated academic instructional time. Of the allocated time devoted to non-academic activities (e.g., business management, transitions between activities), students averaged less than two minutes of academic responding time, or about 5% of the non-academic time. These percentages of academic responding time were significantly different (t = 27.43, p = .000).

Insert Table 2 about here

Students' percentages of academic responding time during specific academic and non-academic activities are shown in Table 3. The percentage of academic responding time was highest for handwriting, about 37%. However, the actual academic responding time was slightly less than three minutes. Other academic activities such as spelling, reading, math, and language yielded similar percentages of academic responding time. Students were engaged in academic responding for about 30% of the time during these activities. Social studies and science activities resulted in students being engaged in academic responding only about 10% to 15% of the allocated instructional time. Finally, the non-academic activities of management of classroom business, transitions between activities, and arts and crafts resulted in students being engaged in academic responding five percent or less of the time.

Insert Table 3 about here

Comparisons of the percentage of academic responding time for each combination of specific activities revealed numerous significant differences; significant results are shown in Table 4. Generally, results revealed that the percentage of academic responding time was not significantly different during reading, math, or language instruction, but that the percentage of academic responding time

during these activities was significantly higher when compared to the academic activities of social studies and science and when compared to each of the non-academic activities. Additionally, the percentage of academic responding time during handwriting was significantly higher than the percentage of academic responding time during each of the other academic activities.

Insert Table 4 about here

To What Extent Does the Percentage of Academic Responding Time Differ as a Function of the Tasks Used?

The percentage and the minutes of academic responding time during different classroom tasks are represented in Table 5. The percentage of academic responding was highest during paper and pencil activities. Students were actively engaged in academic responding about 40% of the time during paper and pencil tasks, which equaled slightly less than 5 minutes of academic responding. The students' percentage of academic responding time was about 30% during instruction using readers or workbooks and worksheets. Since more classroom time was allocated to instruction using these tasks, the actual minutes of academic responding time was higher, about 19 minutes and 16 minutes, respectively, of academic responding time while using readers and workbooks/worksheets. Listening to a teacher lecture and discussion with the teacher resulted in academic responding time percentages of five percent or less.

Insert Table 5 about here

The extent to which these tasks resulted in significantly different percentages of student academic responding time is shown by the t test comparisons listed in Table 6. The percentage of academic responding was significantly higher during paper and pencil tasks when compared to all other tasks. The rate of academic responding did not differ significantly during instruction using the tasks of readers, workbooks, or worksheets. The percentage of academic responding time was significantly higher during the tasks of readers, workbooks, and worksheets than during the classroom tasks of other media instruction, lecture, and class discussion.

Insert Table 6 about here

To What Extent does the Percentage of Academic Responding Time Differ as a Function of the Teaching Structure?

This question addressed the extent to which students' academic responding time differed as a function of how the students were grouped for instruction. As is evident in Table 7, results indicated that percentages of academic responding time were similar during small group (34%) and individual instruction (35%). However, due to the small amount of time allocated to individual instruction (less than 2 min), students actual academic responding time during individual instruction was only approximately 50 seconds. Students academic

responding time was lowest during entire group instruction, averaging about 21% of the time engaged in academic responding.

Insert Table 7 about here

Comparisons of the percentage of academic responding time during the three teaching structures revealed that students engaged in significantly more academic responding during small group than entire group instruction. However, individual instruction did not result in significantly higher rates of academic responding than other teaching structures. Results of the *t* tests for differences in academic responding time for various teaching structures and also for the other teaching variables of teaching location and teacher activity are listed in Table 8.

Insert Table 8 about here

To What Extent Does the Percentage of Academic Responding Time Differ as a Function of the Teacher's Location Relative to the Students?

Students' academic responding rates were similar (about 30%) while the teacher was at his/her desk, at the side of the individual student, or out of the room (see Table 9). While it may appear surprising that students' percentage of academic responding was high with the teacher out of the room, it is important to note that the actual amount of academic responding time in minutes with the teacher out of the room was only about two minutes. Students' average rates

of academic responding were lowest (about 16%) while the teacher was in front of the classroom.

Insert Table 9 about here

Significance tests completed on the differences in the rates of academic responding for the different teacher locations generally indicated that percentages of academic responding were significantly lower while the teacher taught in front of class than during most other teaching locations. Results of the t tests for comparisons of percentages of academic responding time for teacher locations are presented in Table 8.

To What Extent Does the Percentage of Academic Responding Time Differ as a Function of the Teacher Activity?

Students' average rates and minutes of academic responding during various teacher activities are presented in Table 10. The percentage of academic responding was generally highest while the teacher was either giving approval or was not displaying any observable teaching response. Students were engaged in academic responding about 30% of the time during these teacher activities. The rates of academic responding were significantly higher during the periods of no teacher response than during all other teacher activities other than approval. Results of these and the other significant t test results are contained in Table 8.

Insert Table 10 about here

Discussion

Results of this investigation revealed that students' academic responding time does differ as a function of the instructional ecology. Understanding the impact of different instructional contexts on student rates of academic responding has important implications for improved classroom practices. Since student academic responding is significantly correlated with student achievement (cf. Borg, 1980; Graden, Thurlow, & Ysseldyke, 1982a), efforts to increase students' academic responding time through manipulation of the instructional ecology likely will be associated with more effective teaching and enhanced student learning.

A summary of results of the current study reveals that students' percentage of academic responding tended to be higher during academic activities such as handwriting, spelling, reading, math, and language, using tasks such as paper and pencil activities, readers, workbooks, and worksheets, in small group or individual settings, with the teacher at his/her desk or at the side of the student, and with the teacher either not responding or giving approval. In contrast, students' percentages of academic responding tended to be lower during non-academic activities or during academic activities such as social studies and science, using the task formats of lectures and teacher-student discussion, in entire group instruction, with the teacher teaching in front of the class, and with the teacher involved in teaching, other talk, or disapproval.

Instructional ecology variables that are associated with higher percentages of student academic responding appear to share common characteristics, the instructional ecology variables with higher engagement rates can be characterized as providing students the opportunity to respond and to engage in academic practice and as having an academic emphasis. Researchers investigating effective teaching have identified a strong academic emphasis and adequate opportunity to learn as major variables contributing to effective teaching (Anderson, Evertson, & Brophy, 1979; Brophy, 1979; Evertson & Anderson, 1978; Good, 1979; Good & Grouws, 1977).

The importance of an academic focus was supported in this study. Not surprisingly, it was found that students' academic responding rates were significantly higher during academic activities than during non-academic activities. An implication of this finding for improved classroom practice is to increase time allocated to academic activities while minimizing time spent in transitions, classroom management, and other non-instructional events. Other researchers have reached similar conclusions on the negative impact of transition and management time. Arlin (1979) found that off-task behaviors increased significantly during transitions. Investigations of effective teachers by Evertson and Anderson (1978) and Good and Grouws (1977) found that effective teachers allocated more time to academic tasks, covered more content, and had less time spent in management activities. Also, the Beginning Teacher Evaluation Study of academic engaged time (cf. Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980) revealed that time allocated to academic activities was

positively associated with achievement gains. Importantly, these investigators concluded that greater amounts of time allocated to academics was not associated with lower student motivation.

In addition to a strong academic emphasis, a second commonality of the instructional ecology variables that resulted in higher student academic responding was the opportunity to respond and to engage in academic practice, a variable highlighted by Anderson (1978), Filby (1978), Greenwood, Delquadri, Terry, and Hall (1981), and Stallings (1980). In the current study, students' rates of academic responding were higher in activities, tasks, structures, and teacher variables that provided greater opportunities for student academic response and practice. For example, students' responding rates were higher in general during handwriting, spelling, reading, math, and language activities than in social studies and science activities. The set of activities associated with higher academic responding rates tended to provide more opportunity for academic practice behaviors such as writing and reading. On the other hand, science and social studies tended to require fewer academic responses, less opportunity to respond, and more passive responses by students. An implication of this finding would be the need to provide more opportunity for active academic responding (e.g., discussing) during science and social studies instruction.

Similar findings of the importance of opportunity to respond were revealed for different tasks. Tasks such as paper and pencil activities, readers, workbooks and worksheets, which give students an opportunity to practice, resulted in higher academic responding rates

than the task formats of lecture and teacher-student discussion, which tended to result in students being more passively involved. An improvement in classroom practice may be to increase the opportunity for more student discussion in addition to teacher discussion, and to provide students an opportunity to become academically engaged during lecture formats by using outlines and note-taking to keep students involved.

The importance of students having an opportunity to respond on their academic responding rates also is evident in the differential effects of teacher locations and teacher activities. Students were more involved in academic responding with the teacher at their side or at his/her desk (usually with students engaged in seatwork) than when the teacher was in front of the class (usually in a lecture format). Interestingly, students' rates of academic responding were highest when the teacher was out of the room. One explanation of this result is that the teachers provided very structured directions to keep students engaged in an academic task while they were out of the room. The presence of the observer in the room also may have had a positive effect in keeping students on-task. Teacher activity also had a differential effect on student academic responding rates. Those teacher activities that allowed students the opportunity to respond resulted in higher student academic responding. Thus, the activity of no response by the teacher was associated with high student academic responding. Also, teacher approval was associated with high student academic responding percentages, although it is important to note that the actual time of student academic responding associated with teacher

approval was low. The finding that students' rates of academic responding are lower while the teacher is teaching should not be taken to suggest that teachers should not be engaged in teaching. Rather, this finding may highlight the need to understand the various effects of different teacher behaviors and to ensure that throughout the course of the school day, students receive not only teaching but also opportunity for responding.

Finally, the instructional ecology variable of grouping structure was found to be important. Again, classroom grouping structures which provide more opportunity for responding - small group and individual structures - resulted in similarly higher rates of academic responding than did entire group instruction. However, it must be noted that although the percentage of responding during individual instruction is high, the actual time of academic responding was less than one minute due to the low amount of time allocated to individual instruction. These findings are different from those of previous studies of the effect of different grouping structures on student behaviors. One explanation for these differences may be the ways in which grouping structures and student outcome behaviors were defined in the different studies. For example, other studies (e.g., Anderson & Scott, 1978; Filby, 1978) differentiated between seatwork and other activities. In the current study, seatwork was defined as an entire group structure if all students were completing the same task, while in other studies, seatwork was referred as an individual activity. Student outcome behaviors also differed. In this investigation the dependent variable was student academic responding time, which is a very precisely,

behaviorally defined category of observed academic behaviors. Other investigations employed more global measures such as on-task time or productivity of time.

There were conflicting findings regarding the relationship of allocated time and academic responding time. While previous researchers (Cornbleth & Korth, 1980) reported engaged time was higher when allocated time was lower, these results were not confirmed in the present study. Academic responding time was lower, rather than higher, in social studies and science, which had lower allocated times. Yet, academic responding time was higher during structures that had lower allocated times (small group and individual) than the structure which had the most allocated time (entire group). It is likely that the amount of allocated time is a less important factor affecting student engagement rates than how allocated time is used.

Overall, results indicated that instructional variables do have an impact on students' academic responding. Through an awareness of the effect of different instructional variables on student academic responding, results can be applied to increasing students' time engaged in academic responding. Some cautions need to be stated, however. The conclusions of the study are not meant to imply that students should be engaged in academic responding 100% of the time or that instructional variables that do not result in high rates of academic responding should be excluded from the school day. An academic focus is important, but research also shows that effective teachers also have positive, relaxed classroom environments (Good, 1979). Efforts need to continue to investigate the effect of altering

the instructional ecology on students' engaged time in academic responding. Several investigators (Bergan & Schnapps, in press; Berliner, 1978; Fisher, Marliave, & Filby, 1979) have demonstrated that student engaged time can be manipulated by understanding the relationship between teacher controlled behaviors and student outcomes. Investigations of this nature are a positive step toward applying research to the improvement of classroom practices and teaching.

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Footnote

[1]Two of the CISSAR codes were retitled: teacher position was retitled teacher location and teacher behavior was retitled teacher activity. However, the actual categories and definitions remained unchanged.

Table 1

Summary of Reliabilities Calculated During the Study[a]

Reliability	Mean	Range
Behavioral		
Teacher Position	92.5	69-100
Teacher Behavior	94.4	72-100
Student Response	89.0	60-100
Sequential	93.6	85-99

[a]All reliabilities are expressed as percentages.

Table 2

Academic Responding Time During Academic and Non-Academic Activities

Activity	Academic Responding Time	
	Percentage	Minutes
Academic Composite	28	42.45
Non-Academic Composite	5	1.57

Table 3

Academic Responding Time During Various Class Activities

Activity	Academic Responding Time	
	Percentage	Minutes
Handwriting	37	2.81
Spelling	32	2.71
Reading	30	16.86
Math	30	11.25
Language	28	5.60
Social Studies	17	2.39
Free Time	14	.47
Transition	3	.56
Arts/Crafts	3	.38
Business Management	3	.20

Table 4

Significant t Test Comparisons Between Percentage of Academic Responding Time During Different Activities

Activities	t	df[a]	p
Academic Activities v. Non-Academic Activities	27.43	53	.000
Reading v. Social Studies	5.59	46	.000
Reading v. Arts/Crafts	14.70	38	.000
Reading v. Free Time	3.92	34	.000
Reading v. Business Management	16.70	50	.000
Reading v. Transition	16.37	53	.000
Math v. Social Studies	5.65	46	.000
Math v. Arts/Crafts	16.40	38	.000
Math v. Free Time	4.57	34	.000
Math v. Business Management	18.88	50	.000
Math v. Transition	20.93	53	.000
Spelling v. Social Studies	5.17	41	.000
Spelling v. Arts/Crafts	11.55	33	.000
Spelling v. Free Time	5.97	32	.000
Spelling v. Business Management	13.98	44	.000
Spelling v. Transition	13.09	47	.000
Handwriting v. Reading	3.12	36	.004
Handwriting v. Math	3.09	36	.004
Handwriting v. Language	2.93	36	.006
Handwriting v. Social Studies	6.23	29	.000
Handwriting v. Arts/Crafts	13.70	25	.000
Handwriting v. Free Time	5.07	24	.000
Handwriting v. Business Management	12.30	36	.000
Handwriting v. Transition	12.92	36	.000
Language v. Social Studies	5.05	44	.000
Language v. Arts/Crafts	11.79	37	.000
Language v. Free Time	3.64	34	.001
Language v. Business Management	14.06	48	.000
Language v. Transition	12.84	51	.000
Science v. Spelling	-8.57	40	.000
Science v. Handwriting	-8.19	29	.000
Science v. Reading	-7.89	42	.000
Science v. Math	-11.93	42	.000
Science v. Language	-8.86	40	.000
Science v. Arts/Crafts	2.75	28	.010
Science v. Business Management	3.85	39	.000
Science v. Transition	2.83	42	.007
Social Studies v. Arts/Crafts	5.76	32	.000
Social Studies v. Business Management	6.59	43	.000
Social Studies v. Transition	5.63	46	.000
Free Time v. Business Management	2.87	31	.007

[a]Degrees of freedom varied because students who had no time in either of the compared variables were excluded from the analysis.

Table 5

Academic Responding Time During Various Tasks

Task	Academic Responding Time	
	Percentage	Minutes
Paper/Pencil	38	4.68
Readers	32	18.89
Workbooks/Worksheets	30	15.94
Other Media	11	3.05
Fetch/Put Away	6	.88
Teacher-Student Discussion	5	.39
Listen to Lecture	3	.29

Table 6

Significant t Test Comparisons Between Percentage of Academic Responding Time During Different Tasks

Tasks	t	df[a]	p
Readers v. Paper/Pencil	-2.69	49	.010
Readers v. Listen to Lecture	23.72	53	.000
Readers v. Other Media	11.37	53	.000
Readers v. Discussion	19.36	53	.000
Readers v. Fetch/Put Away	19.43	53	.000
Workbooks/Worksheets v. Paper/Pencil	-3.38	49	.001
Workbooks/Worksheets v. Listen to Lecture	26.24	53	.000
Workbooks/Worksheets v. Other Media	10.76	53	.000
Workbooks/Worksheets v. Discussion	19.41	53	.000
Workbooks/Worksheets v. Fetch/Put Away	22.35	53	.000
Paper/Pencil v. Listen to Lecture	16.89	49	.000
Paper/Pencil v. Other Media	10.78	49	.000
Paper/Pencil v. Discussion	13.38	49	.000
Paper/Pencil v. Fetch/Put Away	14.35	49	.000
Listen to Lecture v. Other Media	-5.57	53	.000
Listen to Lecture v. Fetch/Put Away	-3.92	53	.000
Other Media v. Discussion	3.90	53	.000
Other Media v. Fetch/Put Away	3.73	53	.000

[a]Degrees of freedom varied because students who had no time in either of the compared variables were excluded from the analysis.

Table 7

Academic Responding Time During Various Teaching Structures

Teaching Structure	Academic Responding Time	
	Percentage	Minutes
Individual	35	.78
Small Group	34	11.18
Entire Group	21	32.00

Table 8

Significant t Test Comparisons Between Percentage of Academic Responding Time During Different Teaching Variables

Teaching Variables	t	df[a]	p
Teaching Structures			
Entire Group v. Small Group	-6.11	45	.000
Teaching Locations			
Side v. Back	3.21	52	.002
Back v. Out	-4.05	53	.000
In Front v. At Desk	-10.86	53	.000
In Front v. Among Students	-6.94	53	.000
In Front v. Side	-4.85	52	.000
In Front v. Out	-5.83	53	.000
At Desk v. Among Students	3.27	53	.002
At Desk v. Back	4.94	53	.000
Teacher Activity			
No Response v. Teaching	16.03	53	.000
No Response v. Other Talk	21.29	53	.000
No Response v. Disapproval	11.37	51	.000
Teaching v. Other Talk	9.46	53	.000
Other Talk v. Approval	-3.85	43	.000
Other Talk v. Disapproval	-3.05	51	.004

[a]Degrees of freedom varied because students who had no time in either of the compared variables were excluded from the analysis.

Table 9

Academic Responding Time During Various Teaching Locations

Teaching Location	Academic Responding Time	
	Percentage	Minutes
Out	33	2.10
Side	32	.66
At Desk	31	12.02
Among Students	26	16.94
Back	20	1.08
In Front	16	10.74

Table 10

Academic Responding Time During Various Teacher Activities

Teacher Activity	Academic Responding Time	
	Percentage	Minutes
No Response	33	32.74
Approval	27	.07
Teaching	15	10.67
Disapproval	12	.15
Other Talk	7	.46

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